

## DESCRIPTION

**A METHOD OF GENERATING A MAP DISPLAY  
FOR A GRAPHICAL USER INTERFACE**

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This invention relates to a method of generating a map display for a graphical user interface (GUI) and to a computer program, a computer-readable storage medium, server and apparatus for the same. In particular, the invention relates to such a method comprising the steps of displaying a map  
10 and highlighting an area on the map surrounding a position fix wherein the size of the area corresponds to the accuracy of the position fix.

Japanese patent application, publication number 64-026177 discloses a "measured position display device" which displays a circle about a measured  
15 position whose radius corresponds to the measured position accuracy.

In accordance with the present invention, a method of generating a map display of the aforementioned type is provided further comprising the step of highlighting a second area on the map surrounding a second position fix  
20 wherein the size of the second area corresponds to the accuracy of the second position fix wherein either (a) when the first and second areas overlap, either (i) the one corresponding to the most recent or accurate position fix is displayed on top of the other or (ii) the highlighting of the overlapping area is different from that of those parts of the first and second areas which do not  
25 overlap, or (b) the manner in which at least one of the position fixes is obtained is indicated by the colour of the highlight.

Further provided in accordance with the present invention is a method of generating a map display of the aforementioned type wherein the area highlighted on the map surrounding the position fix is a shape other than a  
30 circle.

Yet further provided in accordance with the present invention is a computer program, a computer-readable storage medium, server and computer for the same as claimed in claims 5 to 8.

5           The present invention will now be described, by way of example only, with reference to the accompanying figures in which:

Figure 1 shows, schematically, mobile cellular telephones MS1 and MS2 communicating together via respective nearby cellular telephone network base station BS1 and BS2;

10           Figures 2 to 4 show telephone displays generated in accordance with the present invention; and

Figure 1 shows mobile cellular telephones MS1 and MS2 in the possession of respective users (not shown) and registered with respective nearby cellular telephone network base stations BS1 and BS2 facilitating voice and data communication with that base station and corresponding cellular telephone network (not shown). Each mobile telephone comprises a GPS receiver (not shown). Mobile cellular telephones MS1 and MS2 operate in accordance with the present invention as illustrated in the following example scenarios:

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#### Example 1

Referring to figure 2, suppose the user of telephone MS1 instructs it to display the user's present location (i.e. that of telephone MS1) on a map.

25           Typically, the most readily available estimate of such a location will be the cell area corresponding to the coverage of the base station BS1 in figure 2 with which telephone MS1 is registered (illustrated in by the diagonal, top left to bottom right hatching).

Thereafter, enhanced cell positioning is used to further limit the area in which mobile telephone MS1 is estimated to be located (illustrated by the diagonal, top right to bottom left hatching). Enhanced cell positioning typically involving measurements in respect of not only the base station BS1 with which

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telephone MS1 is registered but also other nearby base stations that can hear or transmit to telephone MS1.

Lastly, the GPS receiver of mobile telephone MS1 returns a position fix together with an estimate of error (illustrated by the horizontal hatching). Note,  
5 network based and GPS based cellular telephone positioning are well known and hence will not be described in any further detail.

All three hatched areas are displayed over the map with the most recent and most accurate position fix, i.e. the GPS fix, on top of the enhanced cell position fix which in turn is on top of the cell area position fix. By "on top", it is  
10 meant the hatching of one area replaces that of a previous area. As shown in figure 2, the boundaries of hatching are not obscured by hatching on top, but this need not be the case.

Shaded or dynamically highlighted areas, e.g. flashing, could be used as an alternative to hatching. Also, the manner in which each of the position  
15 fixes were obtained could be indicated by the colour of the highlight.

### Example 2

Referring to figure 3, as example 1 except that rather than display the hatched areas one on top of another, the hatching is merged. The density of  
20 hatching therefore directly relates the likely position of the mobile telephone MS1.

Were the areas highlighted by shading instead of hatching, the shading of the overlapping areas could be done by alpha blending. Even if the first and second were areas highlighted by the same colour of shading, the overlapping  
25 areas would appear darker, i.e. still distinguished from those parts of the areas which do not overlap.

### Example 3

Suppose the user of telephone MS1 instructs it to display the user's  
30 present location (i.e. that of telephone MS1) on a map together with the present location of a friend in possession of telephone MS2.

Mobile telephone MS1 polls telephone MS2 to request it return a position fix using its GPS receiver together with an estimate of position error which telephone MS2 does (illustrated in figure 4 by the diagonal, top left to bottom right hatching). Note, the exchange of positioning information between two mobile telephones is known.

Mobile telephone MS1 also determines a position fix using its GPS receiver together with an estimate of both longitude and latitude error (illustrated in figure 4 by the diagonal, top right to bottom left hatching of an elliptical shape where the major and minor axis are the longitude and latitude respectively). Note, the computation of GPS accuracy in longitude and latitude is known from at least Section 7.1.4 of GPS Principles and Applications (Editor, Kaplan) ISBN 0-89006-793-7 Artech House.

Both hatched areas are displayed over the map.

Implementation of a method according to the present invention in such a mobile telephone or indeed any other computer system having a display and a processor may be readily accomplished in hardware, in software (stored either in situ on a computer, on storage media or at a server for transmission to such a computer) or a combination of both. Of course, computer programming and / or computer hardware configuration is well known and would be accomplished by one of ordinary skill in the art without undue burden.